
Space Weather Forecast

Issued on Tuesday, 23 January 2024 at 01:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: CME (coronal mass ejection) currently affecting Earth with further CME forecast on 25 January. Likelihood of minor/moderate storming from both events, with very slight chance of strong storms. Moderate solar activity expected. Chance of radiation storms throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: There are seven sunspot regions on the visible disc. The most active is a rapidly developing large and magnetically complex region in the south-centre of the disc. This large growth and complexity has led to the production of a number of Moderate-class flares, with this region producing the strongest flare of the day. A large and complex region in the northeast has also produced multiple Moderate-class flares. The remaining regions all appear stable or are weakening.

Within the last 24 hours, the most significant CME was from the south centre disc early on 22 January. This has been modelled with a possible arrival on 25 January. Further apparent CMEs from the northwest and north centre disc will be analysed once sufficient imagery becomes available.

Solar Wind / Geomagnetic Activity: Solar winds increased from slightly elevated to close to elevated levels during the afternoon of 22 January due to a CME arrival. Speeds have remained slightly elevated since the CME arrival. Total magnetic field strength reached Moderate levels following the CME arrival as the dense region of plasma crossed the Earth. The important north south component of the total magnetic field started to vary moderately due to the perturbations caused by the CME. Resultant geomagnetic activity was Quiet to Unsettled.

Energetic Particles / Solar Radiation: Although no solar radiation storms were observed, levels increased close to the S1 (Minor Storm) threshold before subsiding.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is expected throughout from large regions in the south centre disc and a large region in the northeast. There is also a slight chance of X-class flares.

Solar Wind / Geomagnetic Activity: The effects of the current CME may decline during 23 January, but with low confidence in timing. A further CME is forecast to affect Earth on 25 January with a speed of around 650km/s, although there is uncertainty on whether this will be a glancing blow. There is also a low confidence in a glancing CME, also on 25 January. No significant fast winds are expected in the forecast period. There is a likelihood of G1/Minor or G2/Moderate storms on 23 January, with a declining risk on 24 January. A further risk of G1/Minor or G2/Moderate storms on 25 January due to the second CME arrival. This risk may then continue into 26 January.

Energetic Particles / Solar Radiation: There is a chance of S1 radiation storms on 23 January but with a declining possibility through the day. Further risk of radiation storming through the period due to two extremely complex sunspots in the northeast and southwest which both carry a high risk of producing radiation storms.

Geomagnetic Storms:

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	60	5	50	30
Strong	G3	No	5	1	10	5
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	70	70	70	70
Very Active	R3 to R5 X	No	15	15	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	50	30	30	30
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)